Office of Naval Research International Field Office

Trip Report: Technology Cooperation Team Visit to Korea

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These reports summarize global activities of S&T Associate Directors of the Office of Naval Research International Field Offices (ONRIFO). The complete listing of newsletters and reports are available on the ONRIFO homepage:http://www.onrifo.navy.mil/ under the authors'by-line, or by email to respective authors.

Contents:

Key Words: South Korea, Ministry of Science and Technology, Seoul National University, Korea Aerospace Research Institute, Samsung Advanced Institute of Technology, Littoral Acoustics, Fuel Cells, Batteries, high altitude airships.

Summary

During the period 1-3 April 2002, a visit was made to various South Korean universities and commercial governmental organizations. We were accompanied on the trip by JUSMAG-K personnel (who acted as hosts and scheduled all visits) as well as US Embassy, Seoul, and Air Force Research Laboratory (AFRL) personnel. The primary goal was to revisit specific locations first visited during last fall's (November 2001) Industry Tour for further discussions concerning potential cooperative projects, as well as a specific visit to the Ministry of Science and Technology.

Areas that may be of particular interest to ONR and ONRIFO include the national S&T Policy as developed and furthered by the Ministry of Science and Technology (MOST); Littoral Acoustic studies at Seoul National University (SNU); Fuel Cell and Battery R&D at Samsung Advanced Institute of Technology (SAIT); and High Altitude Airships (HAA) at Korea Aerospace Research Institute.

Background

This visit was a follow-on visit to areas of interest identified during the November 2001 Industry Tour and was held in conjunction with an Air Force Technology Cooperation Team meeting. Primary goals included discussing international cooperation programs with MOST; discussion of latest fuel cell/battery research at SAIT, and HAA discussions at KARI

Highlights of discussions concerning areas of potential collaboration

The site visits are as presented below, in the order in which they occurred.

A. Seoul National University (SNU): We were briefed by Dr Suk-Yoon Hong on the Underwater Acoustics Research Center (UARC) and their current research. UARC has four main research areas: Modeling, Signal Processing, Acoustic Sensors, and Noise Prediction and Control. Current research in the modeling area includes observation of inhomogeneous media (internal waves, eddies), shallow and deep-water internal wave model development, sediment layering effect on sound attenuation, and propagation modeling. The center currently has a total of 13 projects totaling $4 million. Other research areas include ceramic sensors, thin line optical sensors, and synthetic aperture arrays.

B. Ministry of Science and Technology (MOST): Our visit to MOST was conducted in a seminar fashion, with briefs from MOST members and US DoD S&T representatives focused on programs and projects to encourage cooperation and collaboration. The opening remarks by Dr Y.H. Moon, Director General, Science and Technology Cooperation Bureau relayed his vision of promoting international cooperation and what he sees as opportunities for mutual benefit. He set a goal for the seminar of understanding each organization's R&D funding mechanisms. This goal was achieved through formal briefs and informal discussions. The MOST brief included the following points (as presented in their briefing papers):

- Missions of MOST:
  -- To set national policies for S&T development and promotion
  -- To develop core technology, and future-oriented technology (such as space and new materials).

-- To make policies for R&D investment, human resources, and information
-- To formulate policies for the safe use of nuclear technology
-- To pursue international S&T cooperation
-- To promote public awareness of S&T

- R&D investment in South Korea: $ US 12 Billion, 2.68% of GDP
- Selection and concentration strategy in R&D:
  -- Effective use of national R&D resources
  -- Focusing on "6 T's": IT, BT, NT, CT, ST, and ET.
  -- Developing NT, BT, and ST for creating new industries
- Ten "focused" projects (total budget: $US 74.5 Million):
  -- Intelligent Microsystems
  -- Functional Analysis of Human Genome
  -- Tera-Level Nano devices
  -- Plant Diversity
  -- Industrial Waste Recycling
  -- Modulators for Biological Functions
  -- Functional Genomics for Crops
  -- Advanced Material Processing
  -- Applied Superconductivity Technologies
  -- Water Resources Development and Management.

Through focused investment and improved public awareness in Science and Technology, the Koreans hope to elevate the nation to the rank of "most advanced nations" in S&T by 2011. Their investment is fairly substantial, and they eagerly welcome international partners. In fact, 10% of their overall budget is set aside for international cooperation.

C. Samsung Advanced Institute of Technology (SAIT): Two of the briefs here were of particular interest: Batteries and Fuel Cells.

- Batteries:

-- Current Gel-polymer batteries w/power density of 185 Wh/kg, 410 WH/l.

-- Current basic research is focused on transitioning from gel polymer to solid material; they expect 300 Wh/kg by 2003 and 500 Wh/kg by 2005 (at <0.15$/Wh).

- Fuel Cells:

--They currently have a small, portable device that uses methanol and water, with no reformer and no cooling. Their cells range in size from credit card sized (for cell phones, lap tops, etc) at 2W to larger units rated at 2000MW.

-- Current research includes reducing methane crossover in Direct Methane Fuel Cells through the use of synthetic membranes, materials (catalyst, diffusion electrode, and hybrid membrane) and components (methanol flow field, air breathing structures, and Microsystems).

- Further information can be accessed here:

http://www.sait.samsung.co.kr/newsait/res/eba1.htm

D. Korea Aerospace Research Institute (KARI): This visit centered on their current research in High Altitude Airships and possible areas of cooperation. The meeting was attended by Dr Phil Koenig (from this office), Mr Norm Boster, (from Lockheed Martin Tactical Defense Systems) and myself. For Dr Koenig's report, click here: http://www.ehis.navy.mil/onrnews/koenig/2002-04-12KARI_Airship_program.pdf

Assessment

I found this Korean Technology Team Assessment visit to be of immense value. Based on cueing from the previous November Industry tour, the visits to SNU, SAIT, and KARI identified three areas of immense interest to the US Navy. The visit to MOST was beneficial from the standpoint of identifying current Governmental policies and stimulus with respect to S&T and international cooperation. The acoustic work at SNU will be passed to Dr Doug Edsall from this office for follow up; battery and fuel cell work will be passed to the PM at ONR; HAA work at KARI will be followed by Dr Phil Koenig from this office. In light of the proposed NORAD ACTD for a HAA in FY03, the possibility of some collaborative work is very encouraging.

In short, we found items of interest to the US Navy and the Koreans seem to be willing and encouraged to international cooperation with us.

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